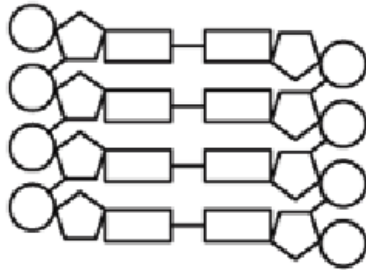


If one nucleotide is omitted or accidentally repeated in the process of DNA duplication, which of the following is most likely to occur?

- F** Gene deletion
- G** Gene mutation
- H** Gene insertion
- J** Gene segregation

Erwin Chargaff studied the DNA of organisms within a single species. Chargaff discovered that the amount of adenine is about equal to the amount of thymine. Which of these explains why the ratio of adenine to thymine is nearly 1:1?

- A** Adenine and thymine pair with each other.
- B** Adenine binds with phosphates, while thymine binds with nitrates.
- C** Adenine and thymine are identical in chemical composition.
- D** Adenine bases contain a form of thymine.



○ = Phosphate

⬡ = Sugar

▭ = Nitrogenous base



39 This illustration is an example of a normal DNA sequence. Which of the following represents a single base change in the sequence?



Part of a DNA strand is represented in the diagram above. In order for DNA to replicate, the strand must separate at which of the following locations?

F Between every phosphate-sugar pair

G Between the eight sugar-base pairs

H Between the four nitrogenous base pairs

J Between any two chemical bonds

Bikini Bottom Genetics

Name _____

Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is a heterozygous (He) OR homozygous (Ho).

TT <u>HOD</u>	Bb <u>He</u>	DD <u>HOD</u>	Ff <u>He</u>	tt <u>HOR</u>	dd <u>HOR</u>
Dd <u>He</u>	ff <u>HOR</u>	Tt <u>He</u>	bb <u>HOR</u>	BB <u>HOD</u>	FF <u>HOD</u>

Which of the genotypes in #1 would be considered purebred? All of homozygous

Which of the genotypes in #1 would be hybrids? All of the heterozygous

2. Determine the phenotype for each genotype using the information provided about SpongeBob.

Yellow body color is dominant to blue.

YY <u>yellow</u>	Yy <u>yellow</u>	yy <u>blue</u>
------------------	------------------	----------------

Square shape is dominant to round.

SS <u>square</u>	Ss <u>square</u>	ss <u>round</u>
------------------	------------------	-----------------

3. For each phenotype, give the genotypes that are possible for Patrick.

A tall head (T) is dominant to short (t).

Tall = TT Tt Short = tt

Pink body color (P) is dominant to yellow (p).

Pink body = Pp PP Yellow body = pp

4. SpongeBob SquarePants recently met SpongeSusie Roundpants at a dance. SpongeBob is heterozygous for his square shape, but SpongeSusie is round. Create a Punnett square to show the possibilities that would result if SpongeBob and SpongeSusie had children. HINT: Read question #2!

	R	r
r	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Rr</div>	<div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">rr</div>
r	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Rr</div>	<div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">rr</div>

- A. List the possible genotypes and phenotypes for their children.

Rr -square rr round

- B. What are the chances of a child with a square shape? 2 out of 4 or 50%

- C. What are the chances of a child with a round shape? 2 out of 4 or 50%

5. Patrick met Patti at the dance. Both of them are heterozygous for their pink body color, which is dominant over a yellow body color. Create a Punnett square to show the possibilities that would result if Patrick and Patti had children. HINT: Read question #3!

	P	p
P	<div style="border: 1px solid black; padding: 2px; display: inline-block;">PP</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Pp</div>
p	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Pp</div>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">pp</div>

- A. List the possible genotypes and phenotypes for their children.

PP pink Pp pink pp yellow

- B. What are the chances of a child with a pink body? 3 out of 4 or 75%

- C. What are the chances of a child with a yellow body? 1 out of 4 or 25%

$B = \text{blue}$

6. Everyone in Squidward's family has light blue skin, which is the dominant trait for body color in his hometown of Squid Valley. His family brags that they are a "purebred" line. He recently married a nice girl who has light green skin, which is a recessive trait. Create a Punnett square to show the possibilities that would result if Squidward and his new bride had children. Use B to represent the dominant gene and b to represent the recessive gene.

	B	B
b	Bb	Bb
b	Bb	Bb

A. List the possible genotypes and phenotypes for their children.

$Bb = \text{Blue}$

B. What are the chances of a child with light blue skin? 100%

C. What are the chances of a child with light green skin? 0%

D. Would Squidward's children still be considered purebreds? Explain!

No

7. Assume that one of Squidward's sons, who is heterozygous for the light blue body color, married a girl that was also heterozygous. Create a Punnett square to show the possibilities that would result if they had children.

	B	b
B	BB	Bb
b	Bb	bb

A. List the possible genotypes and phenotypes for their children.

BB -blue Bb blue bb green

B. What are the chances of a child with light blue skin? 75%

C. What are the chances of a child with light green skin? 25%

8. Mr. Krabbs and his wife recently had a Lil' Krabby, but it has not been a happy occasion for them. Mrs. Krabbs has been upset since she first saw her new baby who had short eyeballs. She claims that the hospital goofed and mixed up her baby with someone else's baby. Mr. Krabbs is homozygous for his tall eyeballs, while his wife is heterozygous for her tall eyeballs. Some members of her family have short eyes, which is the recessive trait. Create a Punnett square using T for the dominant gene and t for the recessive one.

	T	T
T	TT	TT
t	Tt	Tt

A. List the possible genotypes and phenotypes for their children.

TT tall Tt tall

B. Did the hospital make a mistake? Explain your answer.

Yes!

T=tall

Use your knowledge of genetics to complete this worksheet.

1. Use the information for **SpongeBob's** traits to write the **phenotype** (physical appearance) for each item.

Trait	Dominant Gene	Recessive Gene
Body Shape	Squarepants (S)	Roundpants (s)
Body Color	Yellow (Y)	Blue (y)
Eye Shape	Round (R)	Oval (r)
Nose Style	Long (L)	Stubby (l)

- (a) LL- _____ (e) Rr- _____
 (b) yy- _____ (f) ll- _____
 (c) Ss- _____ (g) ss- _____
 (d) RR - _____ (h) Yy - _____

2. Use the information in the chart in #1 to write the **genotype** (or genotypes) for each trait below.

- (a) Yellow body - _____ (e) Stubby nose - _____
 (b) Roundpants - _____ (f) Round eyes - _____
 (c) Oval eyes - _____ (g) Squarepants - _____
 (d) Long nose - _____ (h) Blue body - _____

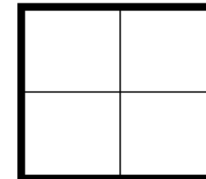
3. Determine the **genotypes** for each using the **information** in the chart in #1.

- (a) Heterozygous round eyes - _____ (c) Homozygous long nose - _____
 (b) Purebred squarepants - _____ (d) Hybrid yellow body - _____

4. One of SpongeBob's cousins, SpongeBillyBob, recently met a cute squarepants gal, SpongeGerdy, at a local dance and fell in love. Use your knowledge of genetics to answer the questions below.

(a) If SpongeGerdy's father is a heterozygous squarepants and her mother is a roundpants, what is her genotype? Complete the Punnett square to show the possible genotypes that would result to help you determine Gerdy's genotype.

What is Gerdy's genotype? _____



(b) SpongeBillyBob is heterozygous for his squarepants shape. What is his genotype? _____

(c) Complete the Punnett square to show the possibilities that would result if Billy Bob & Gerdy had children.



(d) List the possible genotypes and phenotypes for the kids.

(e) What is the probability of kids with squarepants? _____ %

(f) What is the probability of kids with roundpants? _____ %

T. Trimpe 2003 <http://sciencespot.net/>

Bikini Bottom Genetics

Name _____

Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is a heterozygous (He) OR homozygous (Ho).

TT _____ Bb _____ DD _____ Ff _____ tt _____ dd _____
 Dd _____ ff _____ Tt _____ bb _____ BB _____ FF _____

Which of the genotypes in #1 would be considered purebred? _____

Which of the genotypes in #1 would be hybrids? _____

2. Determine the phenotype for each genotype using the information provided about SpongeBob.

Yellow body color is dominant to blue.

YY _____ Yy _____ yy _____

Square shape is dominant to round.

SS _____ Ss _____ ss _____

3. For each phenotype, give the genotypes that are possible for Patrick.

A tall head (T) is dominant to short (t).

Tall = _____ Short = _____

Pink body color (P) is dominant to yellow (p).

Pink body = _____ Yellow body = _____